METHODS AND SYSTEMS FOR MODEL REDUCTION AND SYSTEM IDENTIFICATION OF DYNAMIC SYSTEMS WITH MULTIPLE INPUTS

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ABSTRACT OF THE DISCLOSURE

Methods and systems for model reduction and system identification of dynamic systems are disclosed. In one embodiment, a method includes generating a plurality of statistically independent random numbers for use as input signals, and performing a singular-

10 value-decomposition directly on the system response due to a simultaneous excitation of the plurality of input signals. Alternate embodiments further includes sampling individual pulse responses for the first two time steps, and constructing Hankel-like matrices from which the state-space system matrices (A, B, C, D) are obtained. Since the system response is sampled almost exclusively for the single representative input, the model construction time is

15 significantly reduced, especially for a large-scaled dynamic systems. The plurality of input signals may be filtered through a low-pass filter. Alternately, the plurality of input signals may also include applying multiple step inputs in a sequential manner, and applying multiple pulse inputs in a sequential manner.

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